

-51-

What is claimed is:

- 54-3  
5B1
1. A polymer blend of at least three copolymers comprising:
    - a first polymer having a melting point between 55 to 75°C comprising a copolymer of ethylene and at least one  $\alpha$ -olefin;
    - a second polymer having a melting point between 85 to 110°C comprising a copolymer of ethylene and at least one  $\alpha$ -olefin; and
    - a third polymer having a melting point between 115 to 130°C comprising a thermoplastic polymer.
  2. A polymer blend, as defined in claim 1, wherein said third polymer is selected from the group of a copolymer of ethylene and at least one  $\alpha$ -olefin, LDPE, HDPE, and propylene copolymers.
  3. A polymer blend, as defined in claim 1, wherein said third polymer comprises a copolymer of ethylene and at least one  $\alpha$ -olefin.
  4. A polymer blend, as defined in claim 1, further comprising a fourth polymer having a melting point between 80 to 105°C.
  5. A polymer blend, as defined in claim 1, further comprising a fourth polymer having a melting point between 90 to 100°C.
  6. A polymer blend, as defined in claim 4, wherein said fourth polymer comprises a copolymer of ethylene and a vinyl ester or alkyl acrylate.
  7. A polymer blend, as defined in claim 1, wherein said first polymer and said second polymer comprises an interpolymer.
  8. A polymer blend, as defined in claim 1, wherein said first polymer and

-52-

said third polymer comprises an interpolymer.

9. A polymer blend, as defined in claim 1, wherein said second polymer and said third polymer comprises an interpolymer.

5 10. A polymer blend, as defined in claim 1, wherein an interpolymer comprises at least two of said first, second and third polymers.

~~11. A flexible film having at least one layer comprising said blend of claim~~

10 12. A flexible thermoplastic film having at least one layer comprising a blend of at least three polymers comprising:

a first polymer having a melting point between 55 to 75°C comprising a copolymer of ethylene and at least one  $\alpha$ -olefin;

15 a second polymer having a melting point between 85 to 110°C comprising a copolymer of ethylene and at least one  $\alpha$ -olefin; and

a third polymer having a melting point between 115 to 130°C.

20 13. A polymer film, as defined in claim 12, wherein said third polymer is selected from the group of a copolymer of ethylene and at least one  $\alpha$ -olefin, LDPE, HDPE, and propylene copolymers.

14. A film, as defined in claim 12, wherein said third polymer comprises a copolymer of ethylene and at least one  $\alpha$ -olefin.

25 15. A film, as defined in claim 12, further comprising a fourth polymer having a melting point between 80 to 105°C.

16. A film, as defined in claim 12, further comprising a fourth polymer

-53-

having a melting point between 90 to 100°C.

17. A film, as defined in claim 15, wherein said fourth polymer comprises a copolymer of ethylene and a vinyl ester or alkyl acrylate.

18. A film, as defined in claim 12, further comprising at least one other thermoplastic layer.

19. A film, as defined in claim 12, wherein said blend containing layer has been irradiatively crosslinked.

20. A film, as defined in claim 12, wherein said layer is the innermost heat sealable layer of a tube formed of said film.

21. A film, as defined in claim 12, wherein said film is fabricated into bags.

22. A film, as defined in claim 18, wherein said additional layer comprises a gas barrier layer having an oxygen transmission of less than 15 cc/100 in<sup>2</sup> for 24 hrs. at 1 atm.

23. A film, as defined in claim 18, wherein said film is a tubular multilayer film formed by coextrusion or coating lamination and said blend comprises a heat sealing layer which is the innermost layer of said tube.

24. A film, as defined in claim 12, wherein said film is biaxially stretched.

25. A film, as defined in claim 12, wherein said film is heat shrinkable at 90°C.

-54-

26. A film, as defined in claim 25, wherein said film has at least 30% shrink in at least one direction at 90°C.

27. A film, as defined in claim 12, wherein said blend comprises at least 50 percent by weight of a heat sealing layer.

28. A polymer blend, as defined in claim 12, wherein said first polymer and said second polymer comprises an interpolymer.

29. A polymer blend, as defined in claim 12, wherein said first polymer and said third polymer comprises an interpolymer.

30. A polymer blend, as defined in claim 12, wherein said second polymer and said third polymer comprises an interpolymer.

31. A polymer blend, as defined in claim 12, wherein an interpolymer comprises at least two of said first, second and third polymers.

32. A biaxially stretched, heat shrinkable film comprising at least three layers, wherein said first layer comprises a blend of at least four polymers comprising: a first polymer having a melting point between 55 to 75°C comprising a copolymer of ethylene and at least one  $\alpha$ -olefin; a second polymer having a melting point between 85 to 110°C comprising a copolymer of ethylene and at least one  $\alpha$ -olefin; a third polymer having a melting point between 115 to 130°C comprising a thermoplastic polymer; and a fourth polymer having a melting point between 80 to 105°C; a third layer comprising at least 50 percent by weight of copolymer of ethylene with at least one alpha-olefin or at least one vinyl ester or blends thereof; and a second layer between said first and third layers, said second layer comprising a vinylidene chloride copolymer, a nylon or a copolymer of ethylene with a vinyl alcohol.

33. A biaxially stretched, heat shrinkable film, as defined in claim 32, wherein an interpolymer comprises at least two of said first, second and third polymers.

34. A thermoplastic film of at least two layers comprising, a first layer comprising a first polymer (A) having a melting point between 115 to 130°C and a second polymer (B) having a melting point between 80 to 105°C, and a second layer in direct contact with said first layer without any interposed thermoplastic film layer, said second layer comprising a third polymer (C) having a melting point between 55 to 75°C comprising a copolymer of ethylene and at least one  $\alpha$ -olefin and a fourth polymer (D) having a melting point between 85 to 110°C comprising a copolymer of ethylene and at least one  $\alpha$ -olefin.

35. A biaxially stretched, heat shrinkable film comprising at least five layers wherein said first layer comprises a blend of at least three polymers comprising: a first polymer having a melting point between 55 to 75°C, comprising a copolymer of ethylene and at least one  $\alpha$ -olefin; a second polymer having a melting point between 85 to 110°C, comprising a copolymer of ethylene and at least one  $\alpha$ -olefin; a third polymer having a melting point between 115 to 130°C, comprising a thermoplastic polymer; and optionally a fourth polymer having a melting point between 80 to 105°C; a second layer comprising an ethylene copolymer; a fourth layer comprising an ethylene copolymer; a third layer between said second and fourth layers, said third layer comprising a vinylidene chloride copolymer, a nylon or a copolymer of ethylene with a vinyl alcohol; and a fifth layer comprising at least 50 percent by weight of copolymer of ethylene with at least one  $\alpha$ -olefin or at least one vinyl ester or blends thereof.

36. A biaxially stretched, heat shrinkable film, as defined in claim 35,

-56-

wherein an interpolymer comprises at least two of said first, second and third polymers.

5 37. A process for making a biaxially stretched, heat shrinkable film comprising:

extruding a melt plastified primary tube comprising a first polymer having a melting point between 55 to 75°C, comprising a copolymer of ethylene and at least one  $\alpha$ -olefin; a second polymer having a melting point between 85 to 110°C, comprising a copolymer of ethylene and at least one  $\alpha$ -olefin; a third polymer having a melting point between 115 to 130°C, comprising a thermoplastic polymer; and optionally a fourth polymer having a melting point between 80 to 105°C;

cooling said primary tube;

reheating said cooled tube to a draw point temperature between about 65 to 88°C ;

15 biaxially stretching said tube to a circumference of at least 2 1/2 times the circumference of said primary tube, and cooling said biaxially stretched tube to form a biaxially stretched, heat shrinkable film.

20 38. A process, as defined in claim 37, wherein said draw point temperature is between 65 to 79°C .

39. A process, as defined in claim 37, wherein said resultant film has a total energy absorption value E of at least 1.0 joules.

25 40. A process, as defined in claim 37, wherein said film has a maximum puncture force P of at least 90 Newtons.

41. A process, as defined in claim 37, wherein said film is a monolayer film.

-57-

42. A process, as defined in claim 37, wherein said film comprises at least four additional coextruded layers.

5 43. A process, as defined in claim 37, wherein said film comprises at least one additional coating laminated thermoplastic layer.

44. A process, as defined in claim 37, wherein said biaxially stretched film has at least 30% shrink in at least one direction at 90°C .

10 45. A biaxially stretched, heat shrinkable film, as defined in claim 32, wherein said film has a total energy absorbency of at least 1.0 joules and a maximum puncture force P of at least 90 Newtons.